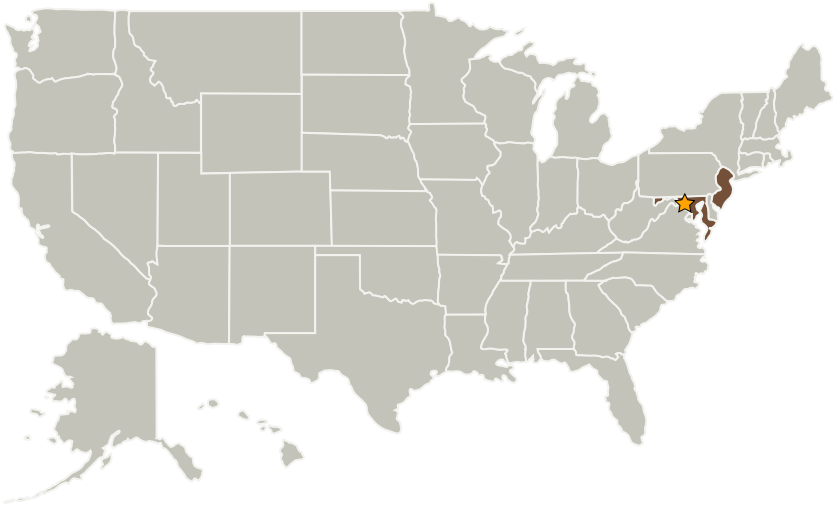
Radiation-Hardened Silicon Integrated Low-Loss Nano-Photonic Switches for Array LIDARs, Phase II

Completed Technology Project (2007 - 2009)

Project Introduction

Manned planetary exploration has become re-invigorated, thanks to President Bush's recent call for a lunar base to be established within two decades and manned landing on Mars sometime after 2030. Such exciting explorations will demand innovative technologies for the next round of manned exploration of space. One such technology that is desired to be advanced is LIDAR -- the LIght Detection And Ranging, for which SMI and Cornell University jointly proposed to develop a 1 x 10 electrically switched silicon nano-optic switch/multiplexer for use with high power lasers in LIDAR systems, especially the fiber-based fixed-array laser transmitter for use in NASA planetary explorations. Specifically, we have invented a few approaches to minimize optical absorption and optical loss in silicon nano-photonics and extend the applicability of silicon from infrared into visible and near-infrared spectrum with wavelengths shorter than 1100nm. These methods will serve as the groundwork for striding progress in Phase II. The prototype 1x16 photonic switch array will have < 10 nano-second switching time, < 3dB optical loss, complete temperature stabilization circuit, electronics driver circuits, and can transmit greater than 200 micro-Joules transmission over 5 nano-second pulse at 10 kHz repetition rate for LIDAR applications.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Structured Materials Industries, Inc.	Supporting Organization	Industry	Piscataway, New Jersey

Primary U.S. Work Locations	
Maryland	New Jersey

Project Transitions

December 2007: Project Start

December 2009: Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers